**Cardiac electrical conductance**

The sinoatrial (SA) node is the heart’s natural pacemaker, containing cells that generate electrical impulses which spread through the atria, triggering contraction of the atria, forcing blood into the ventricles, and stimulating the atrioventricular (AV) node.

The AV node is linked with the atrioventricular bundle of His which transmits impulses to the left and right bundle branches and then to the Purkinje fibres which surround the ventricles. The electrical impulses travel through the Purkinje fibres causing the ventricles to contract and blood forced out of the heart.

**Electrocardiogram (ECG)**

The ECG traces the course of the cardiac impulse by recording the change in electrical potential on the surface of the body. Various parts of the ECG are associated with the travel of electrical impulses through the heart.

The P wave represents atrial depolarisation which causes the atria to contract.

Q is when the impulses arrive at the atrioventricular (AV) node.

The QRS complex represents ventricular depolarisation and atrial repolarisation (ventricles contract and atria relax and refill with blood).

The T wave represents ventricular repolarisation when the ventricles relax and refill with blood.

**Heart construction**

The heart is a muscular, cone-shaped organ located behind the sternum and is approximately the same size as the patient's closed fist.

The heart walls are made up the three structures: the pericardium, myocardium and endocardium.

The pericardium is a thick fibrous membrane which surrounds the heart. Its function is to anchor the heart and prevents over distension (expanding too much).

The myocardium is the central layer of the heart and is formed from cardiac muscle tissue, it is this muscle which provides the force which pumps the blood around the body. Cardiac muscle tissue consists of a network of muscle fibres which branch and connect with each other. If one muscle fibre contracts, this contraction spreads throughout the network of muscle cells. Other structures such as blood vessels and nerves also lie within the myocardial muscle.

The endocardium provides a smooth lining inside the heart and covers the heart valves.

To allow the heart to function as a pump, valves are needed to control the flow of the blood. These are situated at the entrances and exits of the ventricles.

The valves are made up of endocardium and fibrous tissue. The tricuspid and mitral valves (which lie between the atria and ventricles) are prevented from inverting by fine tendons (chordae tendineae) attached to papillary muscles (small extensions of the myocardium).
There are four chambers of the heart, two upper chambers called atria and two lower chambers called ventricles.

The right atrium receives deoxygenated blood from the body, this blood passes through the tricuspid valve then the right ventricle pumps this blood to the lungs to be oxygenated.

The newly oxygenated blood travels to the left atrium and then the left ventricle pumps it to the body.

**Circulation**

**A  Pulmonary circulation**

The deoxygenated blood from the body is pumped from the right ventricle into the lungs. Here has exchange occurs, with oxygen entering the blood and carbon dioxide leaving. This blood, now oxygenated, then returns to the heart.

**B  Systemic circulation**

Oxygenated blood is pumped from the left ventricle to all of the tissues of the body. This allows body cells to receive nutrients and eliminate waste.

Arteries always carry blood away from the heart and all arteries, apart from the pulmonary artery, always contain oxygenated blood.

Veins always carry blood away from the heart and all veins, apart from the pulmonary vein, carry deoxygenated blood.

There are five types of blood vessels, arteries, arterioles, capillaries, venules and veins.

Red corresponds to oxygenated blood and blue deoxygenated blood.